6th CT-User Meeting

Joint venture:

DGK-DVG

WISSENSCHAFT FÜR DIE PRAXIS

Deutsche Gesellschaft für Kleintiermedizin
Fachgruppe der DVG

Arbeitsgruppe CT der DGK-DVG

UNIVERSITEIT GENT

Department of Medical Imaging & Small Animal Orthopaedics; Faculty of Veterinary Medicine
GHENT UNIVERSITY
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Theme:

Contrast Agents and Applications in Computed Tomography

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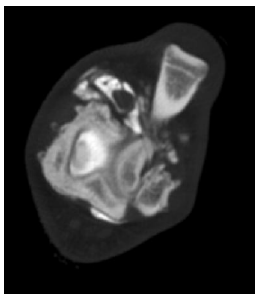
Ghent, Belgium



Proceedings

Equine: Contrast Agents in Computer Tomography

015 Intravenous contrast: Equine Pituitary Gland

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Pituitary pars intermedia dysfunction (PPID) is the most common endocrinologic disorder in horses. Pathophysiologically, PPID results from the slow progressive loss of dopaminergic (inhibitory) input to the melanotropes of the pars intermedia (PI) of the pituitary gland. PPID is thus a progressive neurodegenerative syndrome in horses. An increase in size of the pituitary gland is considered to be associated with PPID. Based on cadaver studies however, variables such as age, size and gender also seem to influence the pituitary gland size in horses. The normal physiologic changes and the pathological changes make it difficult to differentiate normal and abnormal pituitary glands. To allow comparison on living horses the pituitary gland can be easily visualised with contrast enhanced computed tomography (CT). The P:B ratio (used in dogs) allows to compare the size of the pituitary gland of different sized individuals. In a cross-sectional study 32 horses of different gender, age and weight, without PPID were included. On all horses an IV contrast-enhanced CT study was performed. In each case the transverse slice with the largest cross-section height of the pituitary gland was visually selected. On the selected slice, the pituitary gland height was measured in the midline, and the brain area on the same slice was semi-automatically calculated using a segmentation tool. Using these two measurements, the P:B ratio was calculated using the following formula:

P:B ratio = (pituitary gland height (mm)/brain area (mm^2)) x 100

The main finding of the study was the presence of a significant association between the pituitary gland height and the size or age of the horses and the absence of a significant association between the P:B ratio and the size or age of the horses. It was therefore possible to directly compare pituitary glands of horses of different weights. This direct comparison was not possible when the absolute results of the pituitary gland height measurements were used. In the present study a positive, though non-significant ($p=0.06$), association was found between the P:B ratio and age. A possible explanation for this result is the pituitary gland is undergoing the normal growth of an individual and an additional disproportional growth. The normal growth of an individual links the age of the horse to the size of the pituitary gland, as the P:B ratio of a foal is smaller than the P:B ratio of a pony and an adult warmblood, although the size of the pituitary gland of a foal and a pony are both smaller compared to the size of the pituitary gland of an adult warmblood. The disproportional growth of the pituitary gland can be seen as focal or multifocal hypertrophy and hyperplasia of the PI. As in this histological pituitary gland grade 2, the PI can increase up too twofold in size without abnormal plasma ACTH concentration and these are considered normal aging changes. Unfortunately, the different parts of the pituitary gland could not be distinguished with the used IV contrast enhancement protocol. Especially, as the largest pituitary glands were not seen in the oldest horses and the inclusion criteria of the study were most likely biased towards histologically grade 1 for the older horses, compared to histologically grade 1 and 2 for younger horses. In the future, a double intra-arterial contrast enhancement protocol perhaps could help differentiating between the different parts of the pituitary gland, but further research on this topic is needed.

In the study no gender related differences were detected. In the literature pregnant and lactating mares are described as having larger pituitary glands in comparison too non-pregnant or lactating mares. Both pregnant and lactating mares however were not included in the study population.

In conclusion, the pituitary gland size is influenced by the size and age of the horses. The use of the P:B ratio is a valuable method for reducing the differences in absolute pituitary gland height measurements and allows a comparison between the pituitary glands of variable sized and aged horses. Further research on different contrast-enhancement protocols would be interesting to be able to differentiate the